B777 Alerting Issues – Hydraulics failure (single system)

1. Initiating Condition: Complete fluid loss for the single most critical hydraulic system (center system) in cruise

Type	Alert or cue	Threshold for alert or cue to be presented	Confusion regarding alert or cue	Other issues with regard to alert or cue	When alert is inhibited/suppressed or when cue is masked	How alert or cue is terminated
Visual Alerts	EICAS advisory message "HYD QTY LOW C"	Low fluid quantity in center hydraulic reservoir	If rate of fluid loss is slow, the pilots could be prompted to execute the Hydraulic Fluid Quantity Low-Center System procedure, and then have to perform the Hydraulic Pressure -Center System procedure.		New EICAS advisory message display is inhibited during before/engine start; during takeoff between 80 knots airspeed and 400 feet radar altitude or 20 seconds after takeoff, whichever occurs first; during autolanding (LAND 2 or LAND 3) from 200 feet radar altitude to landing; and after engine shutdown	Cancel (and also recall) by pressing the CANC/RCL button. Otherwise the indication remains active as the hydrualic condition continues through the end of the flight.
	EICAS caution message "HYD PRESS SYS C" (may alert simultaneously with or after the low fluid quantity, depending on the rate of fluid loss)	Low pressure in center hydraulic system (may be sensed simultaneously with or after the low fluid quantity, depending on the rate of fluid loss)			New EICAS caution message is inhibited before/during engine start and after engine shutdown; NOTE: Individual hydraulic pump caution messages are suppressed by EICAS when the system detects and displays the hydraulic system pressure message	Cancel (and also recall) by pressing the CANC/RCL button. Otherwise the indication remains active as the hydrualic condition continues through the end of the flight.
	C1 & C2 ELEC "FAULT" amber lights on overhead panel	Low pressure sensed at center hydraulic system pumps				
	Master caution lights associated with HYD PRESS SYS C EICAS and beeper	Low pressure sensed at center hydraulic system pumps			New master caution initiation is inhibited before/during engine start; during takeoff between 80 knots airspeed and 400 feet radar altitude or 20 seconds after takeoff, whichever occurs first; during autolanding (LAND 2 or LAND 3) from 200 feet radar altitude to landing; and after engine shutdown	Cancel (and also recall) by pressing the CANC/RCL button. Otherwise the indication remains active as the hydrualic condition continues through the end of the flight.

B777 Alerting Issues – Hydraulics failure (single system)

1. Initiating Condition: Complete fluid loss for the single most critical hydraulic system (center system) in cruise – Cont.

Type	Alert or cue	Threshold for alert or cue to be presented	Confusion regarding alert or cue	Other issues with regard to alert or cue	When alert is inhibited/suppressed or when cue is masked	How alert or cue is terminated
Aural Alerts	Caution beeper associated with HYD PRESS SYS C EICAS	Low pressure sensed at center hydraulic system pumps			Beeper inhibited befoe/during engine start, during takeoff between 80 knots airspeed and 400 feet radar altitude or 20 seconds after takeoff, whichever occurs first; during autolanding (LAND 2 or LAND 3) from 200 feet radar altitude to landing; and after engine shutdown	
Tactile Alerts	None					
Visual Cues	Low hydraulic pressure and fluid quantity indications on Status display				These cues are not very salient (absent the associated alerts) because the pilots have to manually select the Status page on the Display Select Panel in order to see the hydraulic pressure/quality readings	
Aural Cues	None					
Tactile/ Somatic Cues	None					

Expected Pilot Response(s)

- Execute the Hydraulic Pressure -Center System procedure using the Electronic Checklist, QRH, or flight manual.
- As called out in the procedure, recognize and plan ahead for slower flap operation, alternate landing gear extension, partial flap extension with longer runway requirement for landing, reduced speedbrake effectiveness, main gear scrubbing during taxi turns after landing, inability to retract landing gear and slower flap retraction with speed limits (affects go-around and diversion).
- Per the procedure, suppress performing additional procedures for AUTO SPEEDBRAKE and SPOILERS, which will be new EICAS indications that come on later in the flight. Suppress procedures for FLAPS PRIMARY FAIL and SLATS PRIMARY FAIL EICASs that come on during approach. Suppress arming the speedbrake prior to landing. Suppress performing the procedure for the GEAR DOOR EICAS that comes on after manual gear extension. Remember to perform manual spoiler extension after touchdown.

B777 Alerting Issues – Hydraulics failure (single system)

1. Initiating Condition: Complete fluid loss for the single most critical hydraulic system (center system) in cruise – Cont.

Possible sources of confusion with regard to pilot response(s)

- Procedure does not mention that the landing gear cannot be retracted using the alternate means (and the normal system is inoperative in this condition).
- Landing distance requirement must be obtained by consulting source that is external to the procedure.
- If pilots do not also perform the HYD QTY LOW C procedure, they will not see the associated note: "Nose wheel steering may be slow to react. Excessive force on the nose wheel steering tiller may cause abrupt tiller movement in the opposite direction."

How does pilot know condition is resolved/recovered?

- Situation will not be resolved until bringing the aircraft to a stop on the ground.